

## Nuclear Regulatory Commission

## § 20.1007

*Rad* is the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs/gram or 0.01 joule/kilogram (0.01 gray).

*Rem* is the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor (1 rem=0.01 sievert).

*Sievert* is the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv=100 rems).

(b) As used in this part, the quality factors for converting absorbed dose to dose equivalent are shown in table 1004(b).1.

TABLE 1004(B).1—QUALITY FACTORS AND ABSORBED DOSE EQUIVALENCIES

Type of radiation	Quality factor	Absorbed dose equal to a unit dose equivalent <sup>a</sup>
	(Q)	
X-, gamma, or beta radiation .....	1	1
Alpha particles, multiple-charged particles, fission fragments and heavy particles of unknown charge .....	20	0.05
Neutrons of unknown energy .....	10	0.1
High-energy protons .....	10	0.1

<sup>a</sup> Absorbed dose in rad equal to 1 rem or the absorbed dose in gray equal to 1 sievert.

(c) If it is more convenient to measure the neutron fluence rate than to determine the neutron dose equivalent rate in rems per hour or sieverts per hour, as provided in paragraph (b) of this section, 1 rem (0.01 Sv) of neutron radiation of unknown energies may, for purposes of the regulations in this part, be assumed to result from a total fluence of 25 million neutrons per square centimeter incident upon the body. If sufficient information exists to estimate the approximate energy distribution of the neutrons, the licensee may use the fluence rate per unit dose equivalent or the appropriate Q value from table 1004(b).2 to convert a measured tissue dose in rads to dose equivalent in rems.

TABLE 1004(B).2—MEAN QUALITY FACTORS, Q, AND FLUENCE PER UNIT DOSE EQUIVALENT FOR MONOENERGETIC NEUTRONS

	Neutron energy (MeV)	Quality factor <sup>a</sup> (Q)	Fluence per unit dose equivalent <sup>b</sup> (neutrons cm <sup>-2</sup> rem <sup>-1</sup> )
(thermal) .....	2.5×10 <sup>-8</sup>	2	980×10 <sup>6</sup>
	1×10 <sup>-7</sup>	2	980×10 <sup>6</sup>
	1×10 <sup>-6</sup>	2	810×10 <sup>6</sup>
	1×10 <sup>-5</sup>	2	810×10 <sup>6</sup>
	1×10 <sup>-4</sup>	2	840×10 <sup>6</sup>
	1×10 <sup>-3</sup>	2	980×10 <sup>6</sup>
	1×10 <sup>-2</sup>	2.5	1010×10 <sup>6</sup>
	1×10 <sup>-1</sup>	7.5	170×10 <sup>6</sup>
	5×10 <sup>-1</sup>	11	39×10 <sup>6</sup>
	1	11	27×10 <sup>6</sup>
	2.5	9	29×10 <sup>6</sup>
	5	8	23×10 <sup>6</sup>
	7	7	24×10 <sup>6</sup>
	10	6.5	24×10 <sup>6</sup>
	14	7.5	17×10 <sup>6</sup>
	20	8	16×10 <sup>6</sup>
	40	7	14×10 <sup>6</sup>
	60	5.5	16×10 <sup>6</sup>
	1×10 <sup>2</sup>	4	20×10 <sup>6</sup>
	2×10 <sup>2</sup>	3.5	19×10 <sup>6</sup>
	3×10 <sup>2</sup>	3.5	16×10 <sup>6</sup>
	4×10 <sup>2</sup>	3.5	14×10 <sup>6</sup>

<sup>a</sup> Value of quality factor (Q) at the point where the dose equivalent is maximum in a 30-cm diameter cylinder tissue-equivalent phantom.

<sup>b</sup> Monoenergetic neutrons incident normally on a 30-cm diameter cylinder tissue-equivalent phantom.

### § 20.1005 Units of radioactivity.

For the purposes of this part, activity is expressed in the special unit of curies (Ci) or in the SI unit of becquerels (Bq), or their multiples, or disintegrations (transformations) per unit of time.

(a) One becquerel = 1 disintegration per second (s<sup>-1</sup>).

(b) One curie = 3.7×10<sup>10</sup> disintegrations per second = 3.7×10<sup>10</sup> becquerels = 2.22×10<sup>12</sup> disintegrations per minute.

[56 FR 23391, May 21, 1991; 56 FR 61352, Dec. 3, 1991]

### § 20.1006 Interpretations.

Except as specifically authorized by the Commission in writing, no interpretation of the meaning of the regulations in this part by an officer or employee of the Commission other than a written interpretation by the General Counsel will be recognized to be binding upon the Commission.

### § 20.1007 Communications.

Unless otherwise specified, communications or reports concerning the

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regulations in this part should be addressed to the Executive Director for Operations (EDO), and sent either by mail to the U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; by hand delivery to the NRC's offices at 11555 Rockville Pike, Rockville, Maryland; or, where practicable, by electronic submission, for example, via Electronic Information Exchange, or CD-ROM. Electronic submissions must be made in a manner that enables the NRC to receive, read, authenticate, distribute, and archive the submission, and process and retrieve it a single page at a time. Detailed guidance on making electronic submissions can be obtained by visiting the NRC's Web site at <http://www.nrc.gov/site-help/eie.html>, by calling (301) 415-6030, by e-mail to [EIE@nrc.gov](mailto:EIE@nrc.gov), or by writing the Office of the Chief Information Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. The guidance discusses, among other topics, the formats the NRC can accept, the use of electronic signatures, and the treatment of nonpublic information.

[68 FR 58801, Oct. 10, 2003]

### § 20.1008 Implementation.

(a) [Reserved]

(b) The applicable section of §§ 20.1001–20.2402 must be used in lieu of requirements in the standards for protection against radiation in effect prior to January 1, 1994<sup>1</sup> that are cited in license conditions or technical specifications, except as specified in paragraphs (c), (d), and (e) of this section. If the requirements of this part are more restrictive than the existing license condition, then the licensee shall comply with this part unless exempted by paragraph (d) of this section.

(c) Any existing license condition or technical specification that is more restrictive than a requirement in §§ 20.1001–20.2402 remains in force until there is a technical specification change, license amendment, or license renewal.

(d) If a license condition or technical specification exempted a licensee from a requirement in the standards for protection against radiation in effect prior

<sup>1</sup>See §§ 20.1–20.602 codified as of January 1, 1993.

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to January 1, 1994,<sup>1</sup> it continues to exempt a licensee from the corresponding provision of §§ 20.1001–20.2402.

(e) If a license condition cites provisions in requirements in the standards for protection against radiation in effect prior to January 1, 1994<sup>1</sup> and there are no corresponding provisions in §§ 20.1001–20.2402, then the license condition remains in force until there is a technical specification change, license amendment, or license renewal that modifies or removes this condition.

[59 FR 41643, Aug. 15, 1994]

### § 20.1009 Information collection requirements: OMB approval.

(a) The Nuclear Regulatory Commission has submitted the information collection requirements contained in this part to the Office of Management and Budget (OMB) for approval as required by the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*). The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. OMB has approved the information collection requirements contained in this part under control number 3150-0014.

(b) The approved information collection requirements contained in this part appear in §§ 20.1003, 20.1101, 20.1202, 20.1203, 20.1204, 20.1206, 20.1208, 20.1301, 20.1302, 20.1403, 20.1404, 20.1406, 20.1501, 20.1601, 20.1703, 20.1901, 20.1904, 20.1905, 20.1906, 20.2002, 20.2004, 20.2005, 20.2006, 20.2102, 20.2103, 20.2104, 20.2105, 20.2106, 20.2107, 20.2108, 20.2110, 20.2201, 20.2202, 20.2203, 20.2204, 20.2205, 20.2206, 20.2301, and appendix G to this part.

(c) This part contains information collection requirements in addition to those approved under the control number specified in paragraph (a) of this section. These information collection requirements and the control numbers under which they are approved are as follows:

(1) In § 20.2104, NRC Form 4 is approved under control number 3150-0005.

(2) In §§ 20.2106 and 20.2206, NRC Form 5 is approved under control number 3150-0006.

(3) In § 20.2006 and appendix G to 10 CFR part 20, NRC Form 540 and 540A is